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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

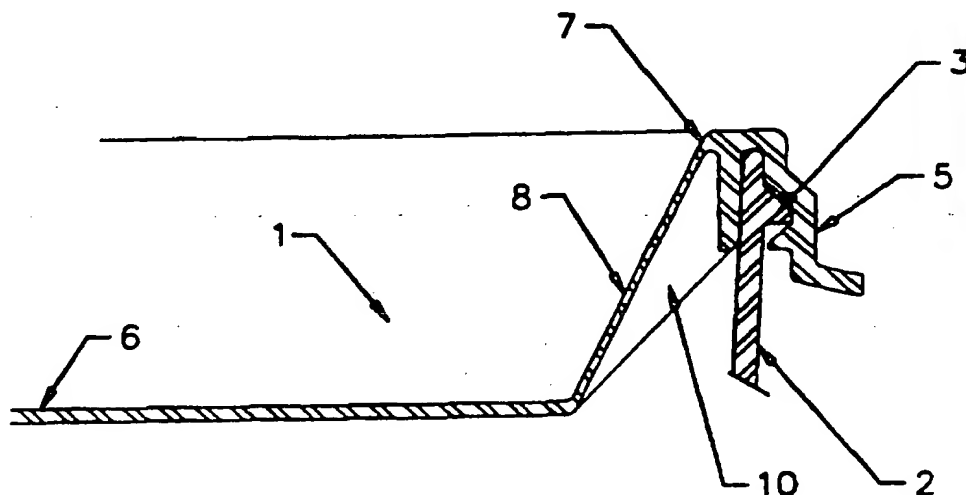
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<p>(21) International Application Number: PCT/DK95/00467 (22) International Filing Date: 23 November 1995 (23.11.95) (30) Priority Data: 1349/94 25 November 1994 (25.11.94) DK (71)(72) Applicant and Inventor: BOCK, Eric [DK/DK]; Valmuevej 6, 4340 Tølløse (DK).</p>		<p>(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

AC

(54) Title: DROP-SAFE PLASTICS LID FOR CONTAINER

(57) Abstract

A plastics lid that cannot transfer twisting moment to the lid rim. This has been achieved by means of a deformable zone between the center and the rim of the lid, as well as a flexible connection between the lid membrane and the rim along the lid top. The purpose of the design is, that the lid is better fixed to the container so that it will not fall off when the container is accidentally dropped.



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Drop-Safe Plastics Lid for Container

This invention is concerned with a plastics lid 1 for a container 2, which may be a plastic bucket.

The lid is mainly a snap-on lid.

- 5 It may be designed for a round, quadrangular or oval container with an exterior 3 or interior 4 snap-rim.

10 Known constructions of pastics lids have the drawback, that they come off the container, if the latter one is being dropped, or they are made so solid that they must be cut from the container, in order to get access to the contents.

15 The purpose of this invention is that of being able to produce a lid that does not come off the container, if the latter one is being dropped, but which can still be fairly easily taken off the container.

20 When a container is being dropped, a large excess pressure is formed inside the container as it hits the ground. It seems like a blow on the under part of the lid, and this blow causes a torsional moment on the rim of the lid 5 on all existing lid constructions. This torsional moment is the principal reason why the lid is coming off when the container is being dropped.

25 This is why the rim 5 of the lid in this invention is flexibly connected to the center of the lid 6 along the top 7 of the rim, thus preventing a moment that would twist the lid off the container.

Even if the rim of the lid stays on the container, there is a risk that the lid will split when dropped, due to the high pressure inside the container, which will act like a blow on the under part of the lid.

30 In order to minimize this blow on the under part of the lid, this invention comprises a surrounding deformable zone 8 in the lid, between the central zone of the lid 6, and the rim of the lid 5.

35 This zone allows the drop energy to be absorbed on a prolonged section by the deformation of the lid, and the blow on the lid is thereby reduced.

40 Looking at fig. 2 it is easy to imagine, that the center of the lid will bulge at a large inner high pressure, because the two absorption lines 9 will function as hinges.

The drop energy must be absorbed as evenly as possible, in order to reduce the energy peak. This is obtained by using absorption lines 9, reduced wall thickness 8, and/or deformable ribs 10 in the deformable zone.

45 The rather thin-walled ribs 10 will, if they are being used at all, become stretched, thereby contributing to the absorption of the drop energy.

They may be placed either radially or slantwise, and they may be made flat or curved.

5 Of-course, the ribs may also be placed on the upper side of the lid, but they will then be more difficult to clean.

Furthermore, the deformable zone must be designed with consideration of the fact, that conical buckets will be stacked without gaskets on the lids of the buckets stacked below.

10 The stacking must be performed as stable as possible. The flexibility of the deformable zone is, therefore, minimized in the radial direction, whereby the buckets standing on top will cause tensions in the lids.

15 When stacking cylindrical buckets, where the stacking is direct on the rim of the lid, this phenomenon has no importance, and the flexible zone can be designed as a bellows with one, as shown in fig. 4, or more waves.

20 The idea of designing a flexible lid is not new, as will be seen from EPO Patent Application No. 92304118.0, dealing with a lid from sheet metal.

25 But there the flexible zone has been placed inside the area, which is stressed by the buckets stacked on top, and consequently the rim of the lid cannot follow the deformations of the bucket on drop impact, whereby it will more easily fall off.

Furthermore, the drop energy will be transferred as a moment on the rim of the lid, whereby it is twisted off the bucket.

30 In the Danish Patent Application 4949/69 is likewise shown a flexible ditch inside the area, which is stressed by a bucket stacked on the lid. In this case the same drawback as described above appeared in that, when dropped, the deformation of lid and bucket could not take place simultaneously, and consequently the lid was twisted off the bucket.

35 Also the AU Patent Application No. 8138723 dealing with a plastics lid describes a flexible lid. But here only flexibility against a thrust from the side of the container is obtained. The inside high pressure will still twist off the lid from the bucket. Furthermore, a bucket stacked on the lid will be rolling loosely during
40 transportation, and thereby be unstable.

In EPO Patent Application No. 92250348.7 the central part of the lid is connected somewhere up at the rim-portion, but the aim of the application was not to produce a drop-safe lid, which in fact was not obtained by the shown
45 design of the rim, since, if anything, the lid would roll off the bucket by an internal high pressure inside the bucket.

Fig. 1 shows a vertical cross-section between a lid 1 and the opening of a container 2, where a deformable zone 8 in the lid was obtained by reducing the wall thickness of the sloping surface.

5

The deformable zone 8 is flexibly connected with the rim of the lid 5 in a line 7 along the top of the rim.

10

Fig. 2 shows a vertical cross-section between a lid 1 and the opening of a container 2, where the deformability of the lid was obtained by reducing the wall thickness in two totally or partially surrounding lines 9, which will act as hinges and allow the center 6 of the lid to bulge by an internal high pressure in the container, without transferring a twist moment to the rim of the lid 5.

15

Fig. 3 shows a vertical cross-section between a lid 1, which snaps internally into a container 2 with an internal snap-rim 4. The flexible zone of the lid 8 is connected along a line 7, which can act as hinge with the rim of the lid 5.

20

Fig. 4 shows a vertical cross-section between a lid 1, which snaps internally into a container 2 with an internal snap-rim 4. The flexible zone of the lid, that in this case is designed as a bellows with a reduced wall thickness which thereby allows deformation, is connected along a line 7 with the rim of the lid 5.

CLAIMS

5 1. Plastics lid for container, characterized in that the center part and the rim portion of the lid are flexibly connected through one or more, totally or partly surrounding wall narrowings situated along the top of the lid rim.

10 2. Plastics lid for container in accordance with Claim 1, characterized in that in the ring-shaped zone inside the flexible connection to the lid rim is a deformable area.

15 3. Plastics lid for container in accordance with Claims 1 and 2, characterized in that the deformable area has a thinner wall thickness than the remainder of the lid.

20 4. Plastics lid for container in accordance with Claims 1 and 2, characterized in that the deformable area has one or more totally or partly surrounding absorption lines that can act as hinges.

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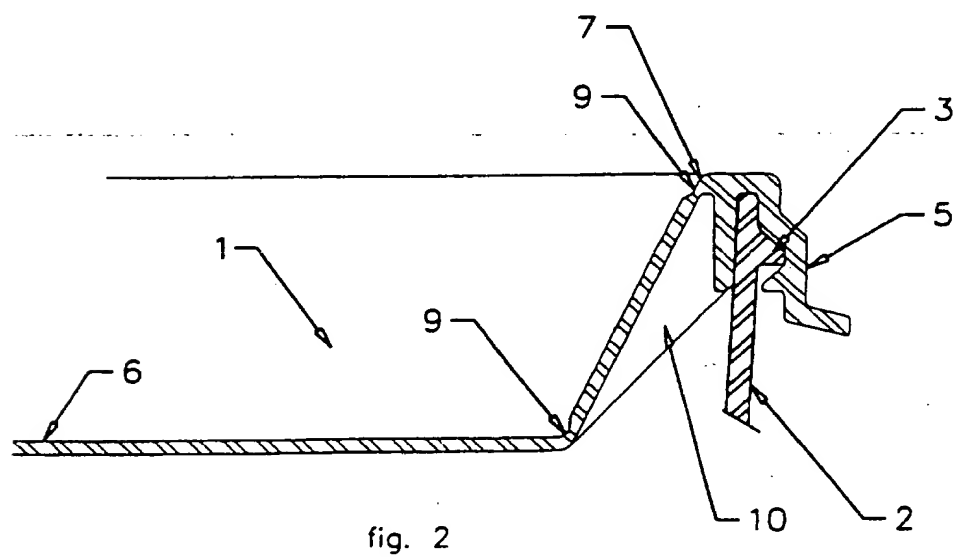
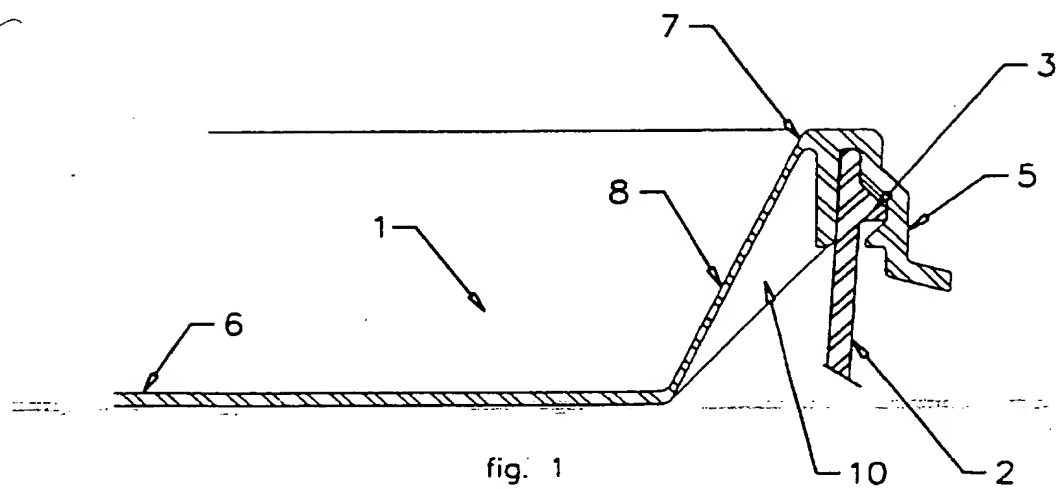
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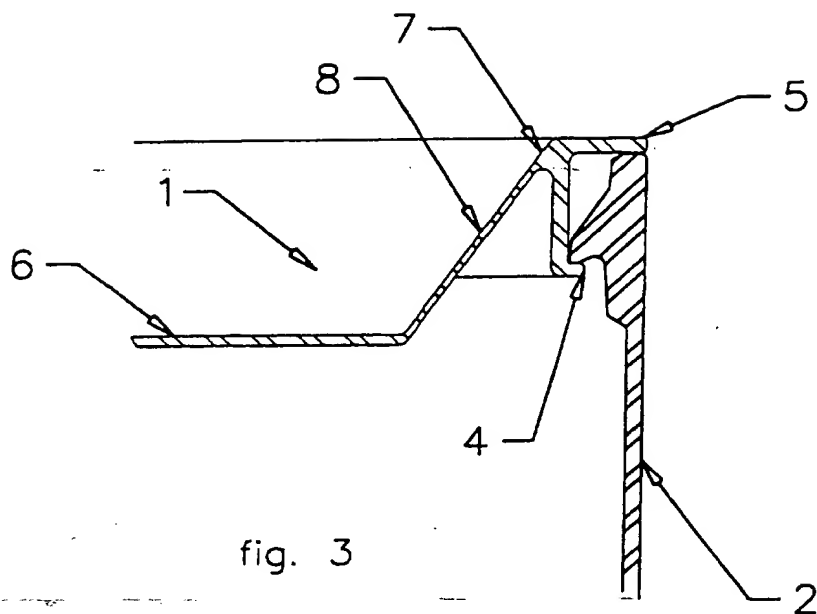


fig. 3

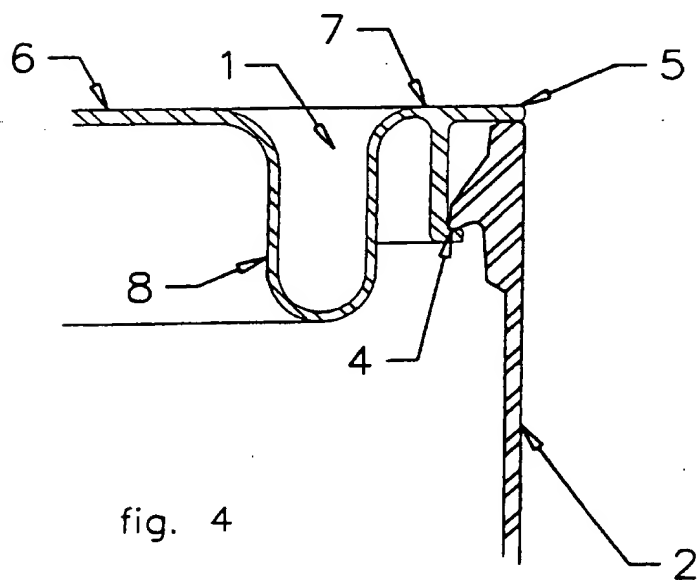


fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 95/00467

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65D 43/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4449641 A (JORGENSEN ET AL.), 22 May 1984 (22.05.84), column 2, line 31 - line 46, figure 1 --	1-3
X	DE 4222396 A1 (DART INDUSTRIES INC.), 11 March 1993 (11.03.93), column 4, line 16 - line 26, figure 2 --	1,2,4
X	US 3170588 A (J.M. LYON, JR), 23 February 1965 (23.02.65), column 2, line 36 - line 52, figure 5 --	1,2,4
X	WO 9009329 A1 (PANTHER PLAST A/S), 23 August 1990 (23.08.90), figure 2, abstract --	1,2,4

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 4388998 A (UNDERWOOD ET AL.), 21 June 1983 (21.06.83), column 5, line 10 - line 28, figure 6 --	1-3
E	WO 9532128 A1 (AMRAX LTD.), 30 November 1995 (30.11.95), figures 2A, 2B, 3, abstract --	1,2,4
A	US 4378895 A (WOINARSKI), 5 April 1983 (05.04.83), figures 5,5A --	1-4
A	EP 0642983 A1 (BROADWAY COMPANIES, INC.), 15 March 1995 (15.03.95), figure 4 -----	1,2,4

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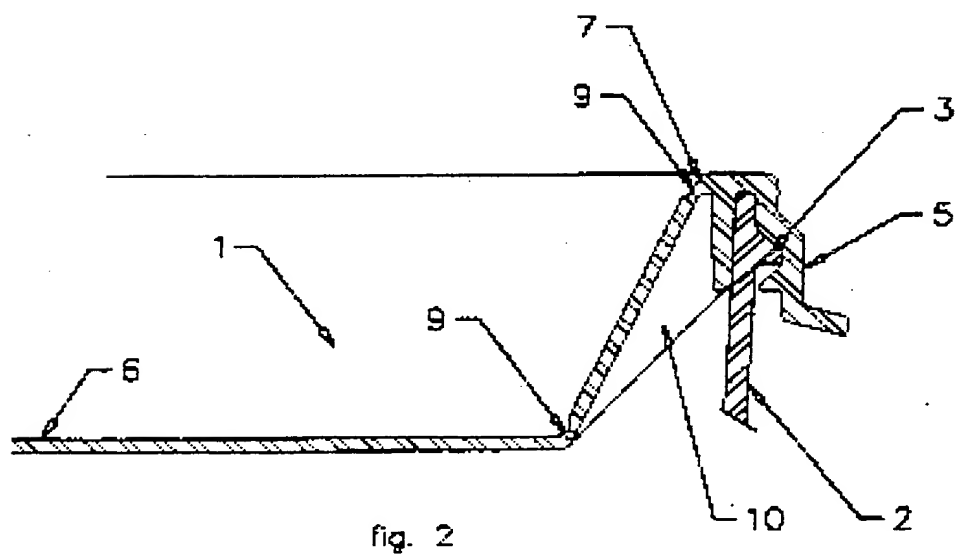
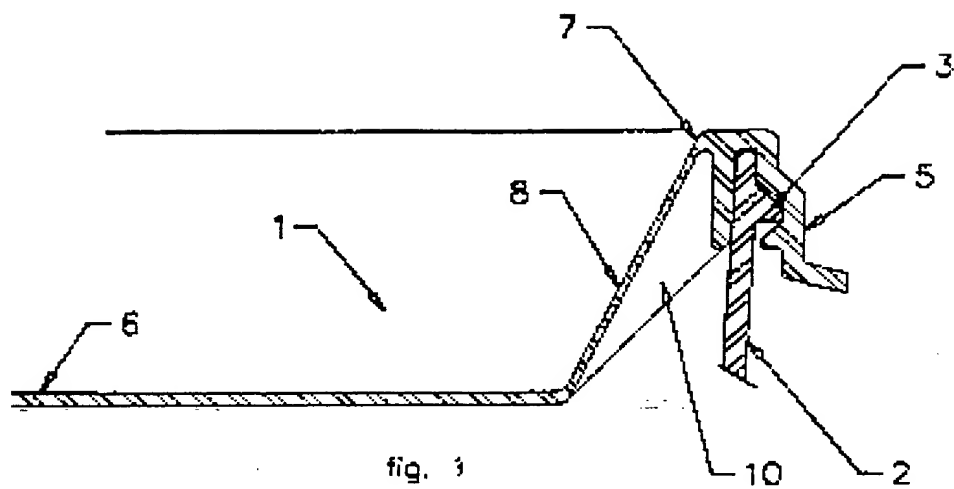
International application No.

PCT/DK 95/00467

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